



**NOAA**  
**FISHERIES**

**SEFSC**

# SEFSC Observer Programs

SEFSC Science Review

June 4, 2013

# SEFSC Observer Programs

- Pelagic Longline
- Shrimp Trawl (Offshore)
  - Skimmer/Butterfly Trawl
- Reef Fish Directed (Bottom Longline & Vertical Line)
- Shark Directed Bottom Longline
- Southeast Coastal Gillnet

# SEFSC Observer Programs Overview

- Sampling design
  - What data are collected
  - Data collection methods
- Bycatch estimation methods

# Pelagic Longline



# Typical Vessels



# Sampling Design

- Stratified random design (mandatory 1992)
  - Strata: 4 seasons (quarters)
  - Strata: 11 geographic areas
- Observer days allocated in proportion to effort
- Vessels randomly selected independently from each area / season combination based on fishing activity from previous year
- 8% coverage level (120 vessels)
- Enhanced coverage in Gulf of Mexico (March through June) for Bluefin tuna (since 2007)

# What Data Collected

- Target: swordfish and/or tuna
- Gear information (longline length, number and kind of hooks, bait)
- Set information (location, time of day, hours of set)
- Species captured (kept, discarded, status)
- Biological data (species, length, sex ID)
- Interaction details (how/where hooked, injury, release methods used)



# Data Collection Methods

- Each selected vessel assigned a minimum number of gear deployments (hauls) for a selection period (normally achieved in a single trip).
- During an observer trip, every gear deployment during that trip is observed.
- Every animal caught during a gear deployment is recorded.
- No subsampling within a trip.



# Finfish Bycatch Estimation Methods

- **Total Fishing Effort** (in numbers of hooks and sets), by year, quarter, and area - obtained from Pelagic Longline Logbooks
- **Bycatch per unit effort** (sets, hooks), in number of fish, for each year, quarter, and area – obtained from Pelagic Longline Observer Program (POP)
  - observers record catch by species, disposition, size (measured and estimated), set location, date, and additional details not used for bycatch estimation
- Bycatch estimation uses a delta-lognormal estimator (proportion of sets with positive bycatch and bycatch rate of positive sets)
- There are some differences across finfish species in method used when the number of observed sets within a stratum are low (generally less than 30 sets observed)
  - e.g. Pooling observations from adjacent strata, substitution of bycatch rates from logbooks

# Data Sources for Marine Mammal Bycatch Estimation

- Fisheries Logbooks – provide information on TOTAL fishing effort (number of hooks, number of sets)
- Pelagic Longline Observer Program (POP) – observers record set locations, gear types, target species catch, protected species bycatch, and detail on interaction with fishing gear.
- Marine Mammal Serious injury determinations made by reviewing observer comments/descriptions of mammal interactions with gear.
- Bycatch estimation using delta-lognormal estimator
- Sea Turtle also uses delta-lognormal estimator

# Shrimp Trawl (Offshore)



# Typical Vessels



# Sampling Design

- Stratified random design (2007 mandatory)
  - Strata: 3 seasons (trimesters)
  - Strata: 5 geographic areas
  - Strata: 3 depths
- Observer days allocated in proportion to effort
- Federal permitted vessels randomly selected independently from each season / area / depth combination based on fishing activity from previous year
- 2% coverage level (2,100 vessels)
- Skimmer Trawl Coverage (May through August)

# What Data Collected

- Target: shrimp
- Gear information (net type, mesh size, TED, BRD)
- Trawl information (location, time of day, hours of trawl)
- Subsample (one basket from each outboard net)
- Species captured (kept, discarded, status)
- Biological data (species, length, life history)



# Data Collection Methods

- Each outboard net sampled
- Select species (taken out of catch)
- Subsample of catch (75 lb. sample)



# Shrimp Fishery Bycatch Data

- Based on data from several observer programs
  - Historical (1972-1982)
    - Bycatch studies, turtle capture study, TED evaluations
  - Regional Research Program (1992-1997)
  - BRD effectiveness evaluations (1998)
  - Modern (2001-Present)
- Used to provide catch and effort data for Bayesian model





# Bayesian Model

- $\ln(\text{CPUE})_{ijklm} = \text{year}_i + \text{season}_j + \text{area}_k + \text{depth}_l + \text{data set}_m + \text{local}_{ijklm}$
- Catch in numbers for each cell assumed to have negative binomial distribution
  - Allows a finite probability for an observation of 0
- Main effects and local term as expressed above (i.e., on log scale) assigned normal priors
- Model fit using WinBUGS software

# Finfish Bycatch Estimation Method

- $\text{bycatch}_{ijkl} = \text{CPUE}_{ijkl} * \text{nets per vessel}_i * \text{effort}_{ijkl}$
- CPUE: number of fish per net-hour
- Effort: vessel-hours
- Nets per vessel and effort assigned normal priors

# Sea Turtle Bycatch Estimation Methods

- Estimation uses delta-log normal estimator

# Reef fish Directed (Bottom Longline & Vertical Line)



# Typical Vessels



# Sampling Design

- Stratified random design (2006 mandatory)
  - Strata: 2 gear (bottom longline, vertical line)
  - Strata: 4 seasons (quarters)
  - Strata: 2 geographic areas
- Observer days allocated in proportion to effort
- Vessels randomly selected independently from each gear / area / season combination based on fishing activity from previous year
- 5% coverage level (890 vessels)
- Review of vessel selection commissioned – early draft available.

# What Data Collected

- Target: reef fish
- Gear information (longline length, number of reels, number and kind of hooks, bait)
- Set information (location, time of day, hours of set, time on station)
- Species captured (kept, discarded, status)
- Biological data (species, length, gonads, otoliths)
- Protected species





# Data Collection Methods

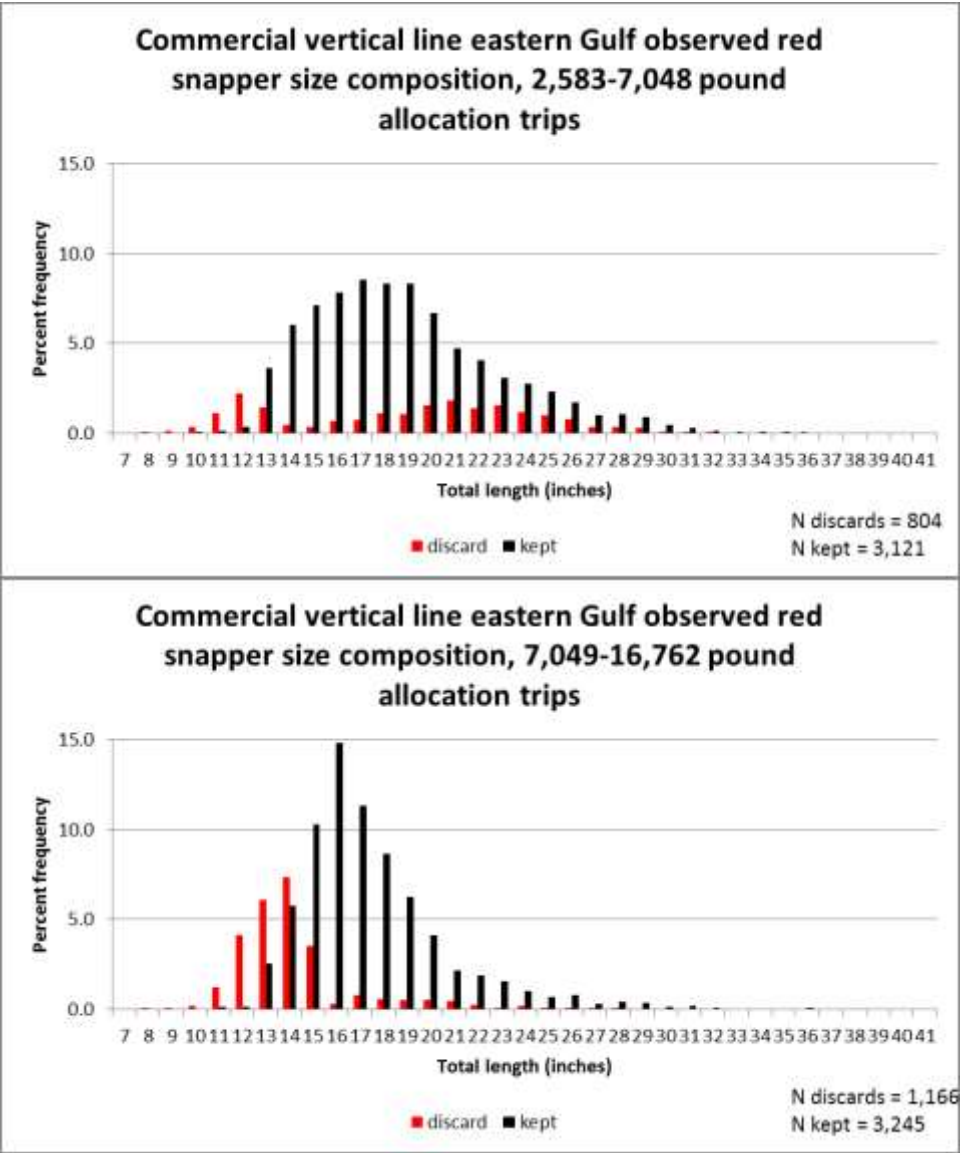
- All species data collection on longline trip
- Vertical reel subsampled (<20% of the time)



# Finfish Bycatch Estimation Methods

- Used to calculate species-specific discard rates for the estimation of total commercial discards in the Gulf of Mexico. Discards can be an important component of total take.
- Total discards estimated using observer data are generally considered more reliable than total discards estimated from self-reported discard logbook data.
- Observer data are the only source for size composition of fish discarded from the commercial fishery
- Observer data provide information regarding depth of capture of discarded fish – this is used to help estimate discard mortality from the commercial fishery.
- Observer data will be used to construct indices of abundance for gag grouper and greater amberjack for SEDAR 33.

# Red snapper size composition by IFQ allocation category



# Sea Turtle Bycatch Estimation Methods

- Fisheries Logbooks – provide information on TOTAL fishing effort (number of hooks, number of sets)
- Bottom Longline Observer Program – observers record set locations, gear types, target species catch, protected species bycatch, and detail on interaction with fishing gear.
- Bycatch estimation using delta-lognormal estimator.
- Review of bycatch estimation methodology commissioned – early draft available.

# Shark Directed Bottom Longline







# Typical Vessels



# Sampling Design

- Stratified Random Design (2002 mandatory) (NMFS 2005)
  - Strata: trimester season based on fishing season
  - Strata: 3 geographic areas
- Observer days allocated in proportion to effort
- Vessels randomly selected independently from each area / season combination based on fishing activity from previous year
- 4-7% Coverage Level (220 permitted vessels)
- Shark Research Fishery (2008) – 10 vessels, 100% coverage, sandbar shark target – shut-down when quota met
  - Research Fishery also functions to conduct gear modification experiments to reduce bycatch with aid of industry
- Review of vessel selection methodology commissioned – early draft available.

# What Data Collected

- Target: large coastal sharks
  - Mixed trips of reef fish and sharks
- Gear information (longline length, number and kind of hooks, bait)
- Set information (location, time of day, hours of set)
- Species captured (kept, discarded, status)
  - Information collected on all species
- Biological data (species, length, life history)
  - Samples to develop age-length keys used in assessments



# Protected Species Bycatch Estimation

- Fisheries Logbooks – provide information on TOTAL fishing effort (number of hooks, number of sets)
- Bottom Longline Observer Program – observers record set locations, gear types, target species catch, protected species bycatch, and detail on interaction with fishing gear.
- Protected Species determinations made by reviewing observer comments/descriptions of interactions with gear.
- Bycatch estimation using delta-lognormal estimator.
- Review of bycatch estimation methodology commissioned – early draft available.



# Southeast Coastal Gillnet

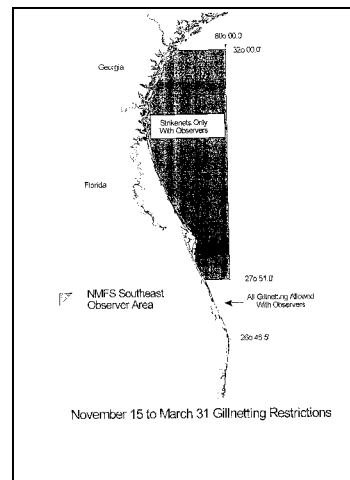


# Typical Vessels



# Sampling Design

- For shark gillnet fishery from 1993-2006, sampling requirements based on Atlantic Large Whale Take Reduction Plan and Biological Opinion under Highly Migratory Species FMP:
  - Primarily two seasons:
    - Right whale calving season 100% observer coverage
      - (observers used primarily to monitor for right whale interactions)
    - Non-right whale calving season (1 April-14 November)
      - 35% observer coverage of shark gillnets based on probability of encountering a prohibited species



- In 2007, Atlantic Large Whale Take Reduction Plan regulations were amended to include the removal of the mandatory 100% observer coverage for shark gillnet

# Current Goals of SE Gillnet Observer Program

- **Collect data on catch and bycatch of all species of fish, shark, and protected resources**
- **Provide estimates of sea turtle or marine mammal interactions occurring within all gillnet fisheries in the southeast US**
- **Original funding by HMS & SERO or ad hoc**
  - **Current funding provided by Atl. Coast observers**
  - **Funding consistent since 2001, but no significant increase in level to coincide with increases in costs – gradual decline in coverage levels**

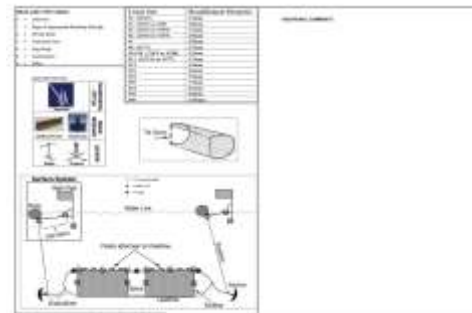
# Sampling Design

- Stratified random design
  - Strata: 4 seasons (quarters)
  - Strata: 2 geographic areas
- Vessels randomly selected independently from each area / season combination based on fishing activity from previous year
- 4-6% coverage level (75-100 gillnet vessels)
- Enhanced coverage in Gulf of Mexico in state waters began in 2012



# What Data Collected

- Target: Species of teleost or shark
- Gear information (gillnet characteristics)
- Set information (location, time of day, hours of set)
- Species captured (kept, discarded, status)
- Biological data (species, length, life history)
- Data forms and elements coordinate with NEFSC gillnet observer programs



# Data Sources for Protected Species Bycatch Estimation

- Fisheries Logbooks – provide information on TOTAL fishing effort (permit holders fishing with gillnet gear)
  - Issue with underreporting
- SE Gillnet Observer Program – observers record set locations, gear types, target species catch, protected species bycatch, and detail on interaction with fishing gear.
- Data are not adequately represented by standard probability distributions
  - Problem with spatial and temporal sampling and protected species interactions being rare events
  - A simple ratio estimator (number of animals / number of observed sets) is generally used to represent bycatch rates.
    - An estimate of uncertainty in these estimates is derived from bootstrap resampling of the observed data set

# General Observer Program Issues





# General Strengths

- Assessment of new gear technologies.
- Relative small size of programs allows quick adaptability to research protocols.
- Many experienced observers and coordination staff.
- Increased compliance and cooperation from the Industries involved in programs.

# General Challenges

- Funding stagnant (no major increase outside catch shares).
- Shark Research Fishery uses most of observer sea days for Shark Program.
- Non-compliant vessels.
- Violation reporting to OLE.
- Gender issues (deployment of females on dominantly male occupied vessels).
- Generally low levels of coverage result in large CV in bycatch estimations for species of particular concern (protected resources, Bluefin Tuna).
- Dispersal of observer program management (3 separate Labs) may inhibit coordination and decrease administrative efficiency.

# Collaborations

- International Commission for the Conservation of Atlantic Tunas (ICCAT)
- Commissions (ASMFC and GSMFC)
- Councils (GMFMC and SAFMC)
- Southeast States
- Gulf and South Atlantic Fisheries Foundation